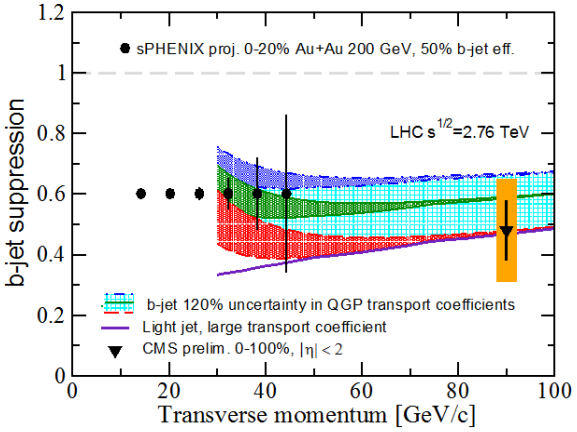
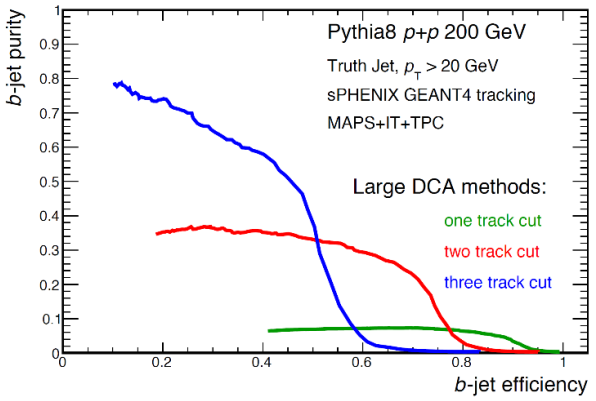
b-tagged jet Topical Group Summary

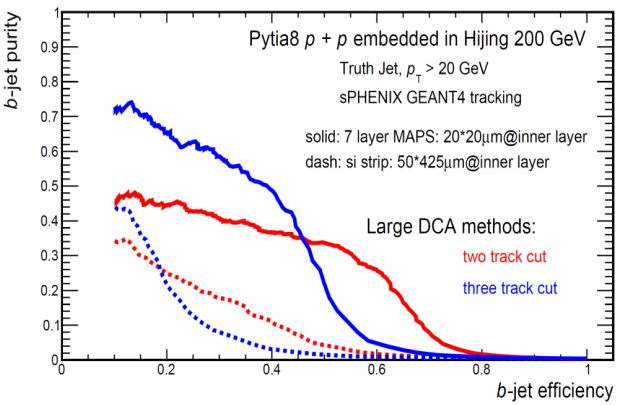
Jin Huang (BNL)
Mike McCumber (LANL)

Overview for plots for MAPS pre-proposal and QM17

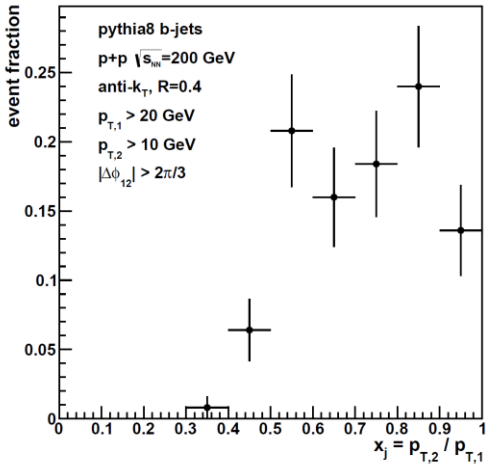
Preliminary: HIJING

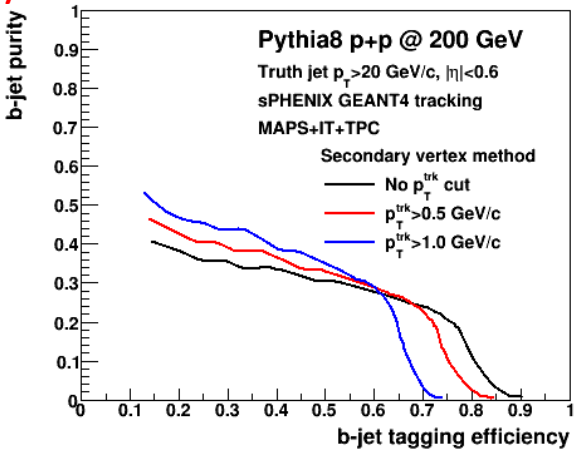




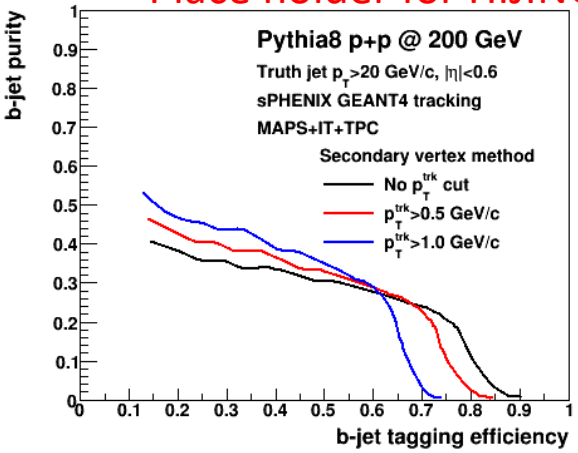


Place holder: Diiet asymmetry



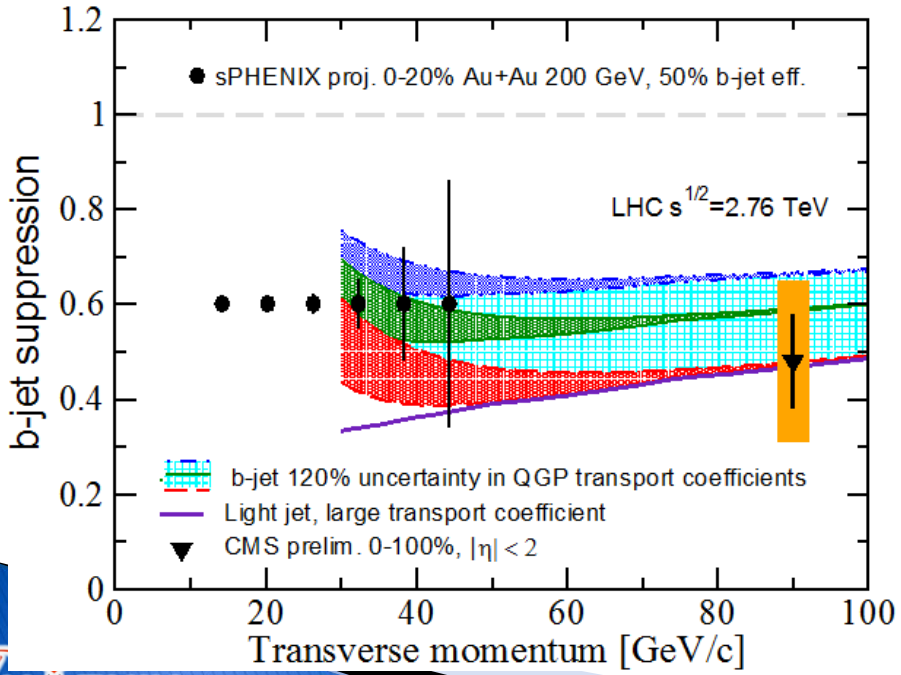


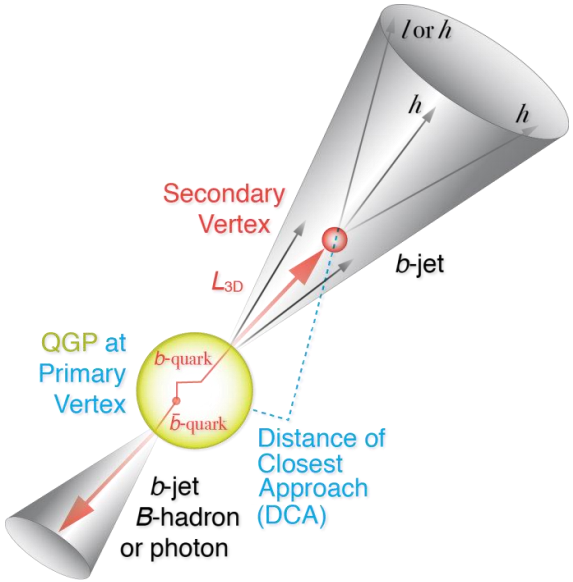
Place holder for HIJING



Luminosity counting

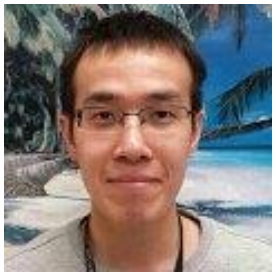
- Current RAA plot assumed 200B MB Au+Au in |z|<10cm
  - 100B MB Au+Au in |z|<10cm assumed for sPHENIX proposal
  - 200B MB Au+Au in |z|<10cm following updated CAD projection
  - Will follow the final luminosity number determined by collaboration for QM17 - Gunther
- For MAPS proposal, we need updated model R_{AA} for RHIC energy



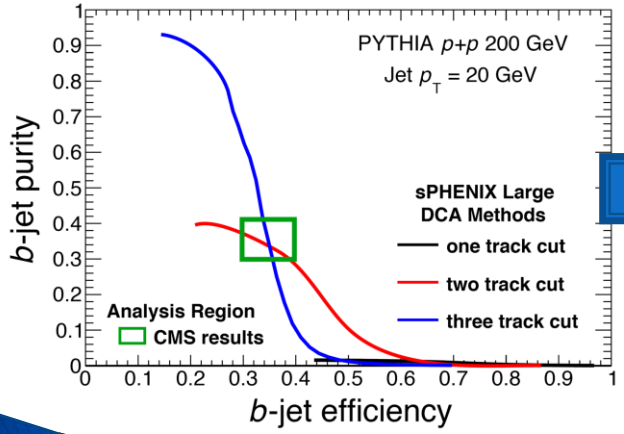


Highlight recent activities:
b-jet tagging – High DCA track counting

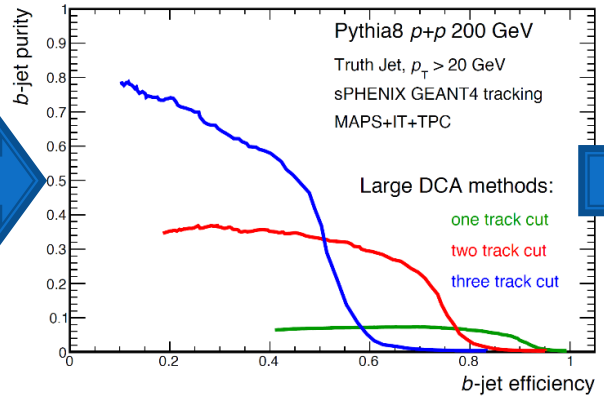
- Progress since last general meeting
  - Dennis and Haiwang implemented track counting tagger in the full Geant4 simulation
  - Haiwang produced projection plot in
- On-going past few weeks
  - Systematically validating the Geant4-based track fit procedure, in order to optimize 3-D DCA and likelihood
- Next
  - Reevaluate in HI background with HIJING embedding
  - Optimizing cuts to suppress fake off-vertex tracks



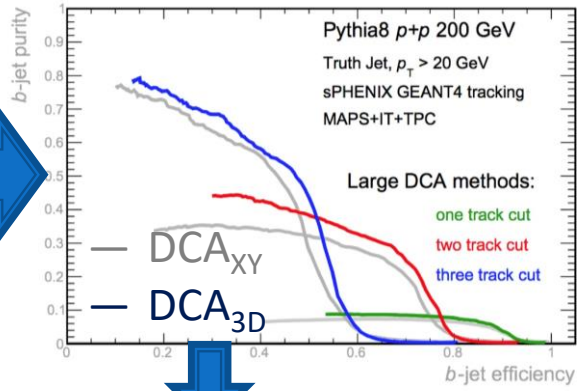
Fast sim in Proposal



Full Geant4 Sim in G4 (DCA_{XY})



Exploring 3-D DCA in G4
NOT optimal tune yet!



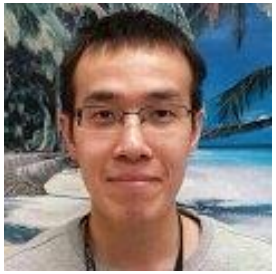
From Haiwang's talk
https://indico.bnl.gov/conferenceDisplay.py?confId=1926

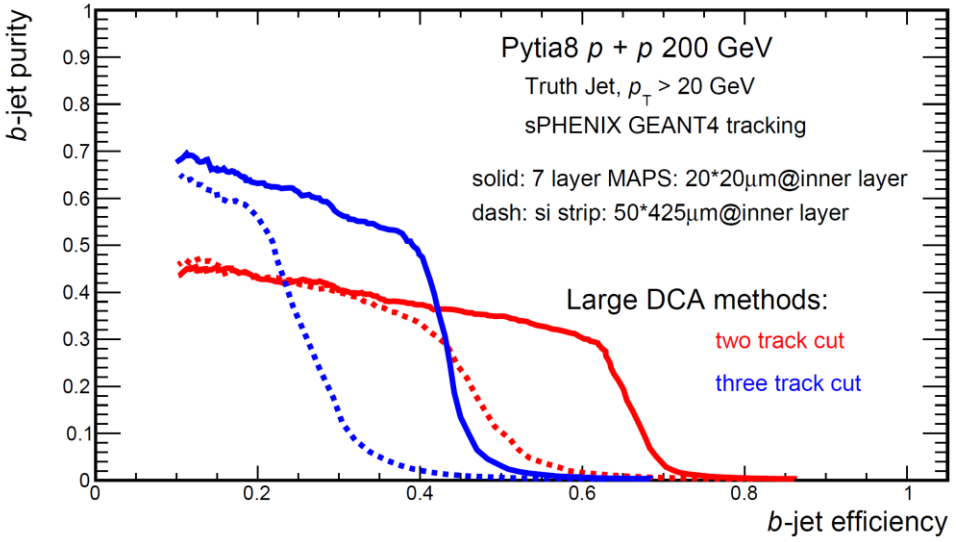
b-tagging performance in HI
Detector choice justifications

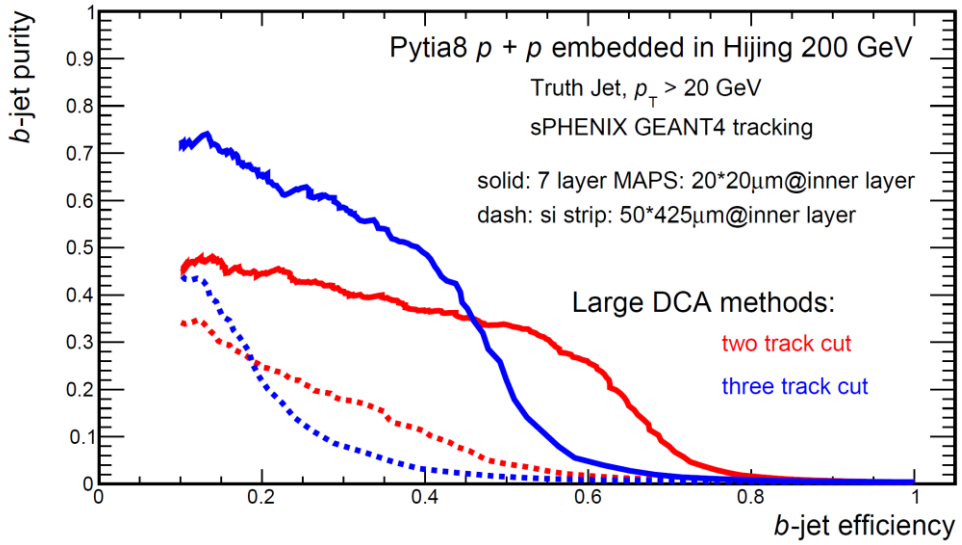
New plots from track counting

- Answering two main questions in this workfest:

1. How we do in HIJING
2. What if we use other technology

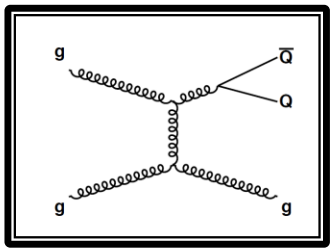


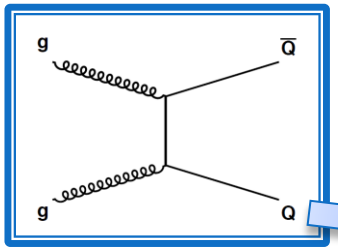


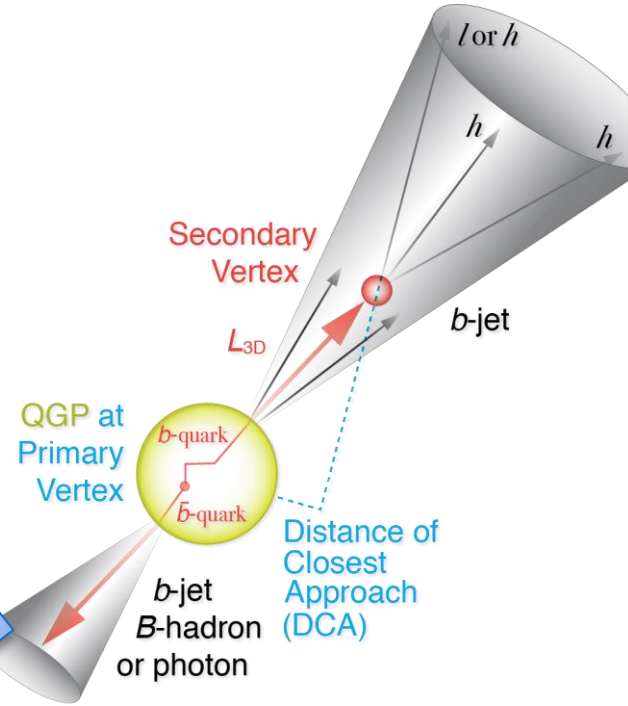


b-quark jet selection: *b*-jet correlation

- Event topology to select *b*-quark jet
  - *b*-jet in correlation with opposite-going *B*-hadron, *b*-jet and photon
- sPHENIX provides good acceptance on *b-di*-jet and *b*-jet – non-prompt-*D* correlations
- Helps on purity of jet and *b*-tagging too
- Near term goals: fast-sim projection







b-jet + *B*-hadron, model

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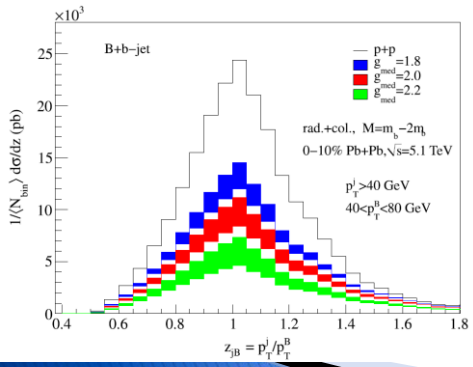
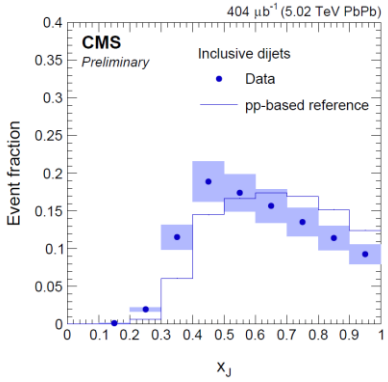
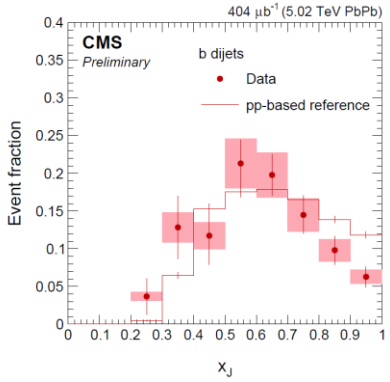


b di-jet, CMS 2016

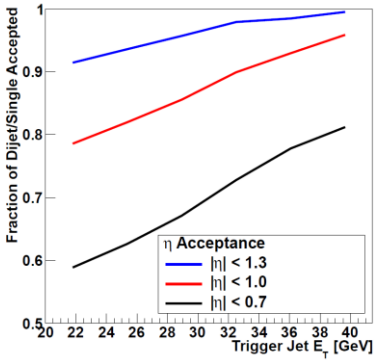
CMS PAS HIN-16-005



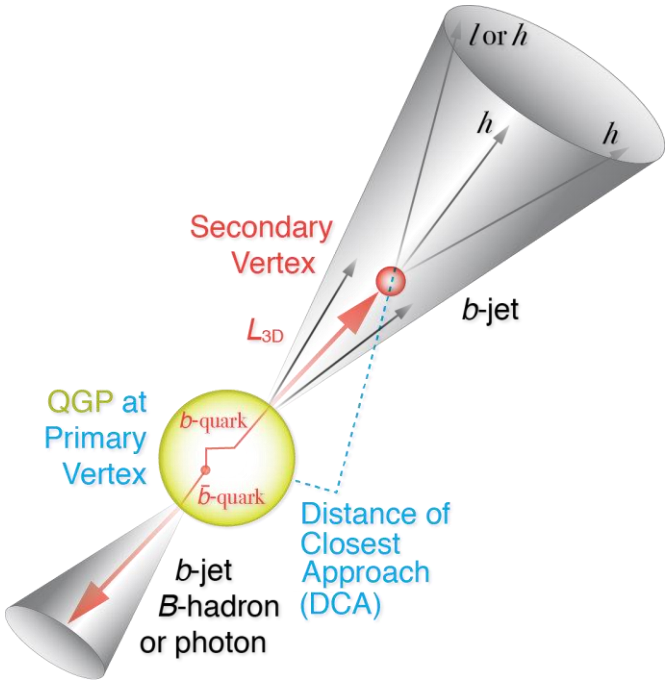


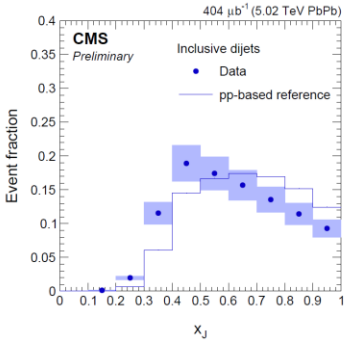
di-jet acceptance in sPHENIX

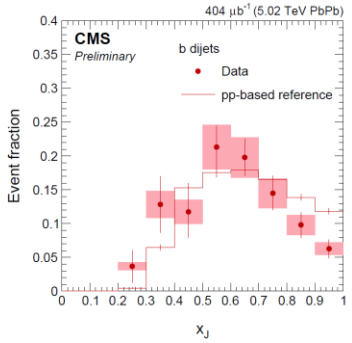
sPHENIX scientific proposal

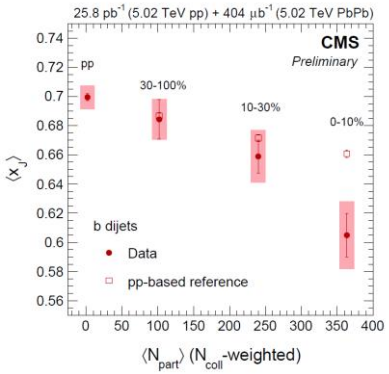


New plots from Di-b-jet asymmetry



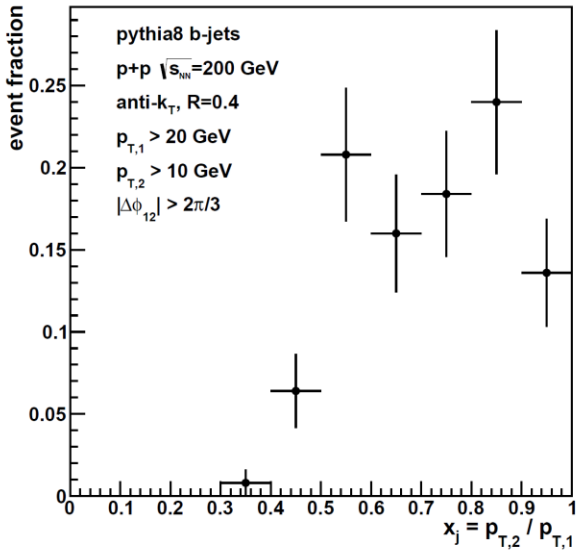


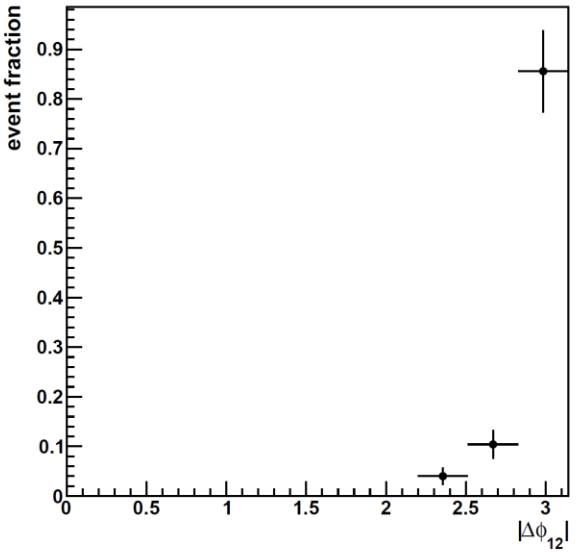


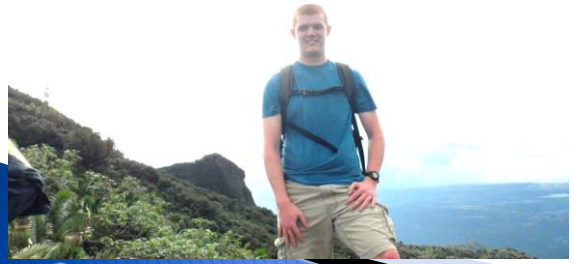


CMS PAS HIN-16-005

Started in workfest : sPHENIX di-bjet asymmetry,
This plot is preview: fast-sim, hardQCD-B, NOT scaled to lumi
- Darren McGlinchey (UCB)





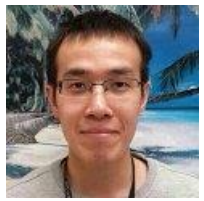


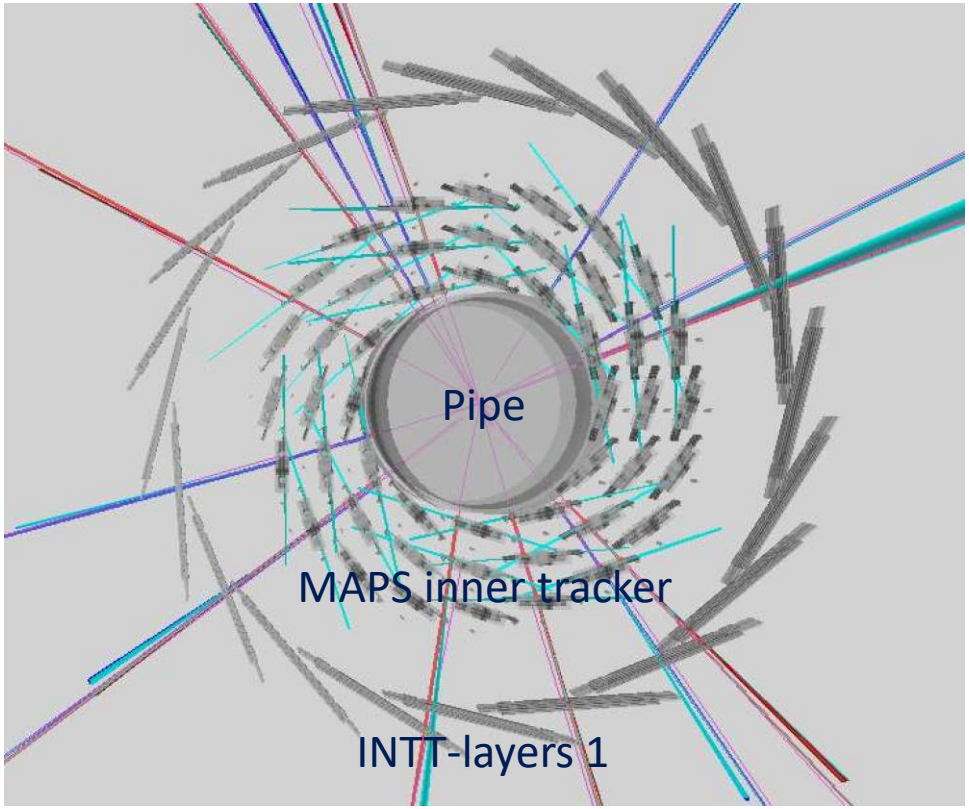
PHENIX

Silicon ladder setup

- Implementing realist geometry in laddered silicon detectors
- Base-code in nightly build
- Tuning on going for
  - INTT ladder thickness
  - Kalman filter to interface with geometry







Summary on High priority development tasks

- Realistic implementation in Geant4
  - Made major progress by Tony and Haiwang
  - Near term goal – fix INTT thickness and merge for general user – Tony, Gaku, Haiwang
- Pile up simulation
  - Mike McCumber developed framework and init tests.
  - Near term goal – complete development for general user – Mike + Gaku?
- Generalized Kalman filter
  - Haiwang Y./Chris P., Improved with ladder geometry
- Multi-vertexing/*b*-tagging via secondary vertexing in jet
  - Sanghoon L./Haiwang Y.: improve fitting utility,
  - Near term goal - HI analysis – Sanghoon
- *b*-jet tagging: Track Counting
  - Haiwang Y./Dennis P.: produced first HIJING performance plot with 7-layer MAPS VS Silicon
  - Near term goal – Certify MAPS+IT+TPC plot for HIJING embedding performance – Haiwang
- *b*-jet tagging: Soft Lepton Tagging, exploratory
- *b*-quark jet selection: di-bjet asymmetry
  - Darren volunteered to lead the work
  - Near term goal – certify plot for proposal and QM17 – Darren
  - Also Xuan Li (LANL) started look at B-meson-b-jet asymmetry